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Health and Development

What Can Research Contribute?

Nancy Birdsall

The conclusions of past research and priorities for future research on the relationship between health and economic development: the effects of development on health and the effects of health on development.

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This paper was prepared by the author when she was Chief, Population and Human Resources Operations Division, Country Department I, Latin America and the Caribbean Regional Office. It is part of a larger effort in the Bank to set research priorities in the economic management of social programs. Copies are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Livia Mitchell, room I4-035, extension 38589 (39 pages).

This article will be published in a book of proceedings (edited by Chen, Kleinman, Potter, and Ware) of a workshop on how social science research has contributed to the health transition -- -- held in June 1989 at Harvard University.

Birdsall's survey of the state of research on the relations between health and economic development discusses first research on how development affects health and then research on how health affects development. Some areas covered:

Research on the household-level determinants of health could aid in the design of public programs to improve health — especially in developing countries, where improving health will require changes in individual and household behavior.

Research on the demand for health care — including the price elasticity of demand for health services and how using health services affects health — could make it easier to improve government pricing policies and design cost control mechanisms.

Work on the determinants of adult (not infant and child) health (morbidity and mortality) should be a high priority, given the epidemiological and demographic transitions going on in virtually all developing countries.

Better understanding of the political economy of health — especially of alternative financing and cost control mechanisms — combined with work on the determinants of adult health, will be critical to public policy to deal with rising health care costs, through the design and efficient financing of public and private health insurance, and through greater emphasis on prevention of adult chronic and degenerative disease.

More systematic analysis of the social returns on investments in health in developing countries may be needed to support continuing increases in ever costlier health care. It is difficult to do cost-benefit analyses, partly because of the difficulty of valuing human life — and of valuing a healthy, painfree life more than a sick and painful one. But other approaches are possible, including analysis of the effects of an individual's health status on productivity (at work or school) and analysis of the social and economic costs of poor health for families and communities.

Efforts to measure the returns on investment in good health are critical in a world of scarcity, where the benefits of many worthwhile investments must be compared. And such efforts are likely to change not only our sense of how much to invest in health but our sense of how to allocate such investments.

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Health and Development: What Can Research Contribute?*

by
Nancy Birdsall**

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Introduction

In this article I discuss, all too briefly, the state of research on relations between health and economic development. The discussion is far from inclusive in coverage of the issues,[1] let alone of the large and growing literature, and is heavily focussed on the contributions of economists. My purpose is limited and specific. It is to provide the necessary background to address the question: How has such research contributed, indirectly if not directly, to improved health[2] of populations in the developing world? And how might such research contribute in the future?

I divide the discussion into two parts: the effects of development on health (or more broadly, the determinants of health status, including non-health factors which change with development such as income, education, the relative price of food, transport, communications and so forth); and the effects of health on development.

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[1] Barlow (1979) reviewed the literature on health and development more than 10 years ago. His review is more thorough in covering the links among health, fertility, income, and nutrition, all of which he treats as endogenous variables in a general model of health and development.

[2] A reader might ask: Why choose an objective of improved health rather than a broader overall development objective? A reasonable objective of economic development is to maximize the discounted sum of (current and future) individuals' "welfare". Health is widely acknowledged to be a critical input to individual welfare, and thus is an objective in itself. In fact, several measures of health (life expectancy at birth and the infant mortality rate) are also widely viewed in the development literature as being among the single best proxy measures for overall development (where development generally refers to material, not necessarily political welfare). Of course, making health an objective in itself does not provide guidance on its value relative to other components of welfare or of development; to do so would go far beyond the more modest objectives of this paper.

This paper began around a simple set of notes for an oral presentation, and grew in length based on many useful comments from readers. Perhaps because of this incremental approach, the discussion throughout the paper is not explicitly linked to any underlying theory or set of assumptions. A few notes on assumptions here will, I hope, at least inform the reader about my prejudices. Central assumptions include:

- Health is produced by households, along with a number of other valued goods, as a function of the resources the household has and the constraints and opportunities it faces; the process of development affects health in part by changing those resources, constraints and opportunities.
- Development depends in part on investment in human capital, including in health; improvement in health of individuals is thus likely to influence the amount and process of development.
- Both health and other aspects of development are affected by public policies. Public policies are affected by many political, economic and social interests; policies are also and can also be affected by better information and thus by better research.

Finally, the contribution of research can and is considered in this paper from both a positive and a normative point of view. Research can help us understand the links between health and development in a positive sense; and given that understanding, it can help us formulate improved health policy to foster development, and improved development policy to foster better health either directly or indirectly.

I. The Effects of Development on Health

State of the Art

Statistical analyses of the determinants of life expectancy and other measures of mortality across nations, mostly by demographers, provide insight into the effects of development (defined here as improvements in the material welfare of the reference population) on individual health. For example Preston (1980) found that per capita income and adult literacy, but not a measure of calorie availability, were closely associated with life expectancy both in 1940 and 1970. However, only half the increase in life expectancy over the intervening 30 years could be explained by changes in the values of those variables. The rest was apparently attributable to changes in public health technology, general improvements in transportation and communication, and possibly changes in the distribution of income or access to health services that were favorable to health. Wheeler (1980) similarly found an increase in life expectancy between 1960 and 1970 that could not be fully explained by such variables as per capita income, adult literacy, population per doctor and population per nurse.

These cross-national studies establish associations between various indicators of development and health, but cannot inform us about whether more development actually causes better health (either on average for entire communities or for those individuals whose higher income or better education is measured as "more development"). An example of our ignorance of the causal sequence emerges indirectly from the studies noted above: although per capita income is associated with or correlated with low mortality (poorer countries

having generally higher mortality),[3] high per capita income is by no means a prerequisite to countries achieving low mortality and thus better levels of health. This lesson is aptly captured in a set of studies entitled Good Health at Low Cost, which consists of case studies of a group of countries and regions that have achieved low mortality despite low per capita incomes, including China, Sri Lanka, the state of Kerala in India, and (at somewhat higher incomes) Cuba and Costa Rica. (Halstead, 1985).[4]

Because there are no internationally comparable measures of morbidity, there have been no cross-national studies of the correlates of morbidity (independent of mortality). In fact, since the available measures of mortality heavily reflect infant and child, as opposed to adult mortality, it is fair to say that existing studies across countries provide little insight into the effects of development on adult mortality or on morbidity at any age (that does not result in death in the short run). I return to this general issue below.

Compared to studies at the national level, studies at the individual and household level have greater potential for revealing underlying behavioral and causal relationships. There is a growing literature on the determinants of health status at the household level, made possible by the increasing availability of household data for developing countries that include such measures of health status as infant and child mortality and (more rarely)

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[3] Income probably has diminishing effects at high levels; additional income probably matters more to health for poorer individuals and poorer nations. See Musgrove (1986) for a good illustration.

[4] Of course the other side of this coin (good health despite being poor) is why these societies, especially the non Communist Sri Lanka, have so often received relatively low economic returns to their large investments in human capital. Section II is concerned with the effects of health on development.

anthropometric measures. Behrman and Deolalikar (1988) provide an extensive and careful review of these studies. They conclude that at the household level, it is difficult to document that higher income improves health.[5] This result may reflect the high correlation of income with other variables that are generally included in such analyses, such as education; and the much greater tendency of such variables as education to reflect past behavior and investments which heavily influence current health. Or it may be, as seems to be true at the national level, that other factors (most notably, mother's education[6]) are more important determinants of the health of household members. Behrman and Deolalikar also conclude that there is little evidence that higher prices, be they for health services, for health goods such as drugs, or for food (and thus nutrition, an important input to good health), contribute to poor health.

Thus the two variables that economists might assume would influence health, income and prices, appear to explain little at the household level. Why these poor results? It may be that community-level variables, such as climate, exposure to disease and the quality of health care available matter more than household income and local prices (measured independent of quality). Or it may be that results are poor because many studies are plagued by

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[5] Thomas et. al. (1990) do find that the predicted logarithm of per capita expenditures, a proxy for income, does enhance child survival, controlling for other factors including parents' education. They use a large data set from Brazil, where the range in income is probably greater than in many household data sets.

[6] Even the importance of mother's education has been questioned. See Wolfe and Behrman (1987).

methodological problems.[7] Many studies of the determinants of health do not actually test directly the effects of truly exogenous variables such as prices (e.g. of food or health services, or of labor -- i.e. wages), or do so in an estimation that also includes improperly specified endogenous variables. Endogenous variables are those that already reflect choices made by the household; if the estimation does not take into account their endogeneity (either by excluding them and estimating a reduced-form equation, or by using simultaneous estimation techniques to purge them of endogeneity), then results can be misleading. For example, if estimates do not take into account the likelihood that sick mothers or children are least able to breastfeed, the apparent positive effects of breastfeeding on children's good health will be

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[7] Behrman and Deolalikar (1988) point out the methodological implications of an important distinction between two categories of analysis. The first includes analyses of either the household demand for health outcomes (e.g. infant mortality) or the household demand for health goods (e.g. the utilization of health services or the purchase of such inputs to health as drugs). In these cases, the dependent variable should be estimated as a reduced form, i.e. solely as a function of variables exogenous to the household, such as wages, the price of food, and the price of health care. An example of such an analysis of health outcomes is that of Rosenzweig and Schultz (1982), in which child mortality in Colombia is estimated as a function of such variables as mother's education and age and community-level food prices and availability of services. Rosenzweig and Schultz find that in that setting, greater availability of services does contribute to lower child mortality, especially for urban households in which mother's education is low (so that services may substitute for low maternal education). See also Strauss (1989) and Barrera (1990). An example of an analysis of the utilization of services is Akin et. al. (1985), in which the household's use of and choice of type of medical service are analyzed as a function of household variables and the cash and time costs of using alternative services.

The second category of analysis is estimation of a health production function. For example, mortality or anthropometric indicators are estimated as a function or output of a set of input variables. Many of these variables, such as utilization of health care, breastfeeding, and consumption of food (and thus nutrient intake) are endogenous (i.e. are the result of choices made by household members) and should be treated as such; others, such as prices, wages and parental endowment (e.g. education and height) are exogenous. (For an example, see Pitt and Rosenzweig, 1985).

overstated. If estimates fail to take into account that very sick children are those most likely to be taken to the health clinic, the positive impact of clinic visits in reducing child mortality will be understated. Worse still, if researchers fail to take into account the possibility that governments are giving priority to placing health services where sickness and mortality are high, the possible positive effects of services on mortality may be understated.[8] Epidemiological studies of specific diseases without adequate control groups are likely to suffer from these types of estimation problems.[9]

In short, household level analyses have not been definitive on the effects of variables that represent policy interventions such as availability or price of health services. However, in these analyses there has been a constant process of advance in understanding, as conceptual and methodological problems have been successively encountered, grappled with, and overcome. Conceptual advances have led to changes in data collection efforts, which have in turn simplified methodological problems. An example is the growing emphasis in data collection efforts on incorporation of community-level variables that represent well exogenous "prices" to the household, including most recently, information on actual cash prices of alternative health services.[10]

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[8] Rosenzweig and Wolpin (1986) provide some impressive evidence on the endogenous location of public health services. This could be a problem with the results of Rosenzweig and Schultz (1982), reported in the preceding footnote.

[9] Non-economists have also developed models that take into account endogeneity. See for example Mosley and Chen (1984), and Briscoe et. al. (1990); the latter paper is entitled "People Are Not Passive Acceptors of Threats to Health: Endogeneity and its Consequences."

[10] Such community-level data have been collected in a few settings, most notably for health in the case of the Cebu (Philippines) study undertaken by researchers at the University of North Carolina, and in surveys sponsored by the World Bank as part of its LSMS program (Living Standards Measurement Study).

What conclusions emerge from the work summarized above?

- o At the national level, high per capita income is not in itself critical to better health. This is perhaps the single most important conclusion.

Though some minimal level of income is almost surely a prerequisite to maintaining good health, that level is fairly low. Above that level, other factors matter as much if not more.

- o Much improvement in health has occurred as a result of development in the broadest sense, not because of improvements in personal health services.

The cross-national studies suggest that in the first two or three decades of the postwar period, improvements in the technology of disease control, in transportation and communication, and in food distribution during emergencies,[11] were important contributors to better health. Many of these factors required no change in health systems in developing countries to bring about lower mortality, and little or no change in individual attitudes or behavior. In this sense, development in the broadest sense has and should continue to contribute to better health.

On the other hand, the relative power of such factors as these, that do not rely on changes in individual behavior (or rely on simple one-time acts

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In the Cebu study, community-level data on prices, service availability and quality of health care, as well as access to transportation, and so on have been collected. For examples of use of such data, see Gertler and van der Gaag (1988), Akin et. al. (1985), and Cebu Study Team (1990).

Unfortunately even these prices may not be immune from endogeneity! Rosenzweig and Wolpin (1989) explore the possibility of migration in response to community prices, which -- if it occurs -- raises questions about the exogeneity of such "prices." For a further comment on this and other problems of methodology in econometric studies of household behavior, see fn. below.

[11] These factors, not included in the analyses, are assumed to explain the "unexpected" improvements in life expectancy reported by Preston and by Wheeler.

such as having children vaccinated) to contribute to ever-lower mortality may be declining. It is natural that diminishing returns to simple widespread interventions such as antimalarial spraying would set in wherever mortality is relatively low (e.g. where the infant mortality rate is below 100 per thousand births).[12] This would imply that in the future, the effects of development on health are likely to be observed more and more through changes in individual behavior, and changes in such factors as education, access to information, and possibly greater access to critical (mostly preventive) health care services that have the potential to affect individual health behavior.

- Education, especially of mothers, is a critical determinant of children's health[13].

In some settings, it probably substitutes for better sanitation (Merrick, 1985), and for greater availability of care and vice versa (Rosenzweig and Schultz, 1982), possibly because availability of care and education both reduce the costs to mothers of getting and exploiting information on how to care for children.

Estimates using the Cebu, Philippines study indicate that mother's education reduces diarrhea by increasing food intake, increasing use of preventive health services, and improving personal hygiene practices (Cebu Study Team,

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[12] For further discussion of this point see Birdsall, 1980 and Birdsall, 1988.

[13] Wolfe and Behrman (1987) argue that much of what appears to be education may simply reflect family background characteristics that are not observed. Their result has not been duplicated, and may result from the fact that educated siblings contribute during childhood to cognitive development of siblings that ultimately receive less formal education; or from a narrow range of differences in education across siblings. Moreover, using the same data set, the authors recently report that differences in education across adult sibling mothers are reflected in changes in their own health (Behrman and Wolfe, 1989).

1990).

- At the household level, use of health services does not seem to make any difference to mortality.

This is paradoxical, given that countries successful in reducing mortality, such as China and Sri Lanka, have emphasized access to basic health services. Of course, health services may matter more for morbidity than for mortality; few household studies have examined morbidity. And at the household level, much use of services is in direct response to illness, whereas the key to low mortality and morbidity in successful countries has been emphasis not on curative services or even services per se but on preventive care through outreach. It is also worth noting that China, Sri Lanka, Cuba and other successful countries have had extensive and effective food distribution systems and relatively well-educated populations.

- In developing countries, use of health services does not appear to be particularly price-elastic, except for the poor.

For the average consumer and within certain ranges, the price of health services has little effect on their use by consumers; (see Akin et. al., 1985; Akin, Birdsall and de Ferranti, 1987). But at the same time, and not surprisingly, prices do matter for the poor, for whom a higher price represents, all other things the same, a bigger chunk of income (Gertler et. al., 198). On the one hand, insofar as use of health services does not matter for mortality (above), it may not seem important that prices discourage use of services by the poor. On the other hand, use even of simple curative services may have important welfare effects, if it relieves pain and anxiety. And existing studies may not sufficiently differentiate between the effects of use of different kinds of services; if high prices discourage use of particularly effective services (e.g. pre-natal care), health costs (including

mortality) may be higher than so far demonstrated.

- o Finally, poor nutrition makes good health unlikely; but poor health also exacerbates malnutrition by reducing nutrient absorption.

It is possible that specific nutrient deficiencies as well as protein-calorie malnutrition have profound effects on health that are not easily addressed through health services.[14]

A final two-part conclusion does not come directly from the literature, but can be inferred. It concerns public expenditures on health. First, these expenditures are only one input to improved health; many other factors (education, transportation, food prices and distribution, even food habits) matter and may matter more. Second, the effect of public expenditures on health is highly dependent on the allocation of those expenditures between cost-effective activities (basic health services, endemic disease control -- largely but not exclusively preventive) and high-cost hospital services.

Potential for Breaking New Ground

Many questions critical for improving health policy and thus health in developing countries remain unanswered. Four potentially fruitful areas of new research are:

- o Additional studies in more settings of several critical aspects of household behavior, e.g. by what mechanisms mother's education makes a difference to child health (and whether there are quick substitutes for mother's education); and whether and how much the price of health care (and of private insurance) makes a difference to use of services of various kinds;

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[14] For example, there is growing evidence that vitamin A deficiency increases susceptibility to mortality as a result of measles and that measles precipitates blindness due to vitamin A deficiency. See World Health Organization, 1988.

- o Analysis of the political economy of public expenditures on health -- the determinants and composition of public spending on health, including of the poor allocation of public resources between largely private goods, especially high-cost hospital care, and the largely public good activities that are more cost-effective in improving health, such as basic health services, disease control, nutritional and epidemiological surveillance;

- o Analysis of alternative financing mechanisms for health care, and alternative mechanisms for controlling costs;

- o New work on concepts, methods and data needs for study of adult health, including not only adult mortality but adult morbidity.

Work on the cost-effectiveness of alternative health enhancing inputs (e.g. doctors vs. nurses, vaccines vs. drugs) is critical for the design of health programs, and could certainly comprise another category. Such work is an input (in effect a tool) for work in other categories, as will become evident below.

Household level studies. Studies of the effects of various measures of development on health at the cross-national level can generate hypotheses, but cannot be conclusive, since they cannot capture variations in the endowments and the price environment of individuals and households which ultimately are what matter. The potential for breaking new ground is thus at the household level, where, despite a large literature using increasingly sophisticated methodology,[15] the potential for policy-relevant results has been limited

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[15] It is of some concern that this line of research, increasingly sophisticated in methodology, is carried out by a relatively small group of economists, most of whom are located in a limited number of centers (at Yale, Pennsylvania, North Carolina, Minnesota). The requirements in terms of training and know-how for success in this area of research are relatively stringent, and low-skilled workers in this vineyard tend to produce work which because of methodological problems is not useful. The Cebu group based at North Carolina (see footnote above) have begun to bridge this gap by publishing their results in epidemiology journals, and by pointing out the links between the approach economists have taken and such approaches as that taken by Mosley and Chen (1984); see Cebu Study Team (1990).

until recently by data problems.

For example, as noted above, in studies to date the effects of prices (of food, health services, etc.) on health have appeared to be surprisingly small. But only recently have household surveys begun to combine information at the household level on income and expenditures for other services as well as health, with the necessary information at the community level on quantity, quality and user prices of health care, related services, food, transportation and so on.[16] Information on other consumption and the prices of other services is necessary because even if households do not reduce use of health services in the face of higher prices for health care, the question arises whether they are reducing consumption of other goods or services that affect health, such as food or education; or reallocating their spending in other ways that imply large reductions in both family welfare and social welfare. Detailed information on the range of health services is necessary because consumers may switch among suppliers (and have high price elasticities across suppliers, though a low elasticity for health services overall.)

For adequate study of the mechanisms by which mother's education affects child health, conventional quantitative household survey data probably needs to be combined with information on attitudes, day-to-day behavior, and on the intrafamilial bargaining process. Specific controlled experiments of effects of interventions across households with different educational profiles could also have high pay-off in generating new hypotheses. The potential for new work on the effects of education on health has been outlined recently by Caldwell (1989).

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[16] See footnote 10.

The political economy of public spending on health. Research in this area could contribute to greatly improved public debate on the appropriate role of government in health. There are at least four critical areas of work. One, alternative models of health finance and provision, is set out as a separate category below. A second is empirical and conceptual work on the actual and appropriate roles of the public vs. the private (non-profit and for-profit) sectors in financing and provision of care, and in provision of information, regulation and other non-service aspects of health care. Empirical work should include analyses of the relative efficiency of the public and private sectors in health in developing countries; these are rare, if only for lack of good data on costs.[17]

A third area of work is development of a theory of "good government," one that would explain variations across countries in the efficiency and equity of public expenditures for health (and other programs). Technical analyses by the World Bank and others tend to indicate that in health, most countries face no real tradeoff between equity and efficiency; e.g. a reallocation of spending from high-cost hospital care to basic services in rural areas would both improve aggregate health indicators and better serve

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[17] For example, in Brazil a hospitalization in a public hospital costs the social security agency 200% more than a hospitalization in a private hospital. The key question is whether this difference is accounted for by the possibility that public hospitals treat more difficult cases. Differences in pathology alone appear to be of limited importance, but it does appear that public hospitals (where mortality rates are about 70% higher) do see more severely ill patients. (World Bank, 1990). For further discussion of the private sector in health, see Griffin (1989).

Much more on the relative efficiency of the private and public sectors has been done in the education area. See, for example, James (1988) and Jimenez et. al. (forthcoming).

the poor.[18] Birdsall and James (1990) note that many governments persist in patterns of spending for health and other social programs despite this lack of tradeoff, apparently because the current pattern better serves those with political power and influence. They also note that alterations in that apparent equilibrium have and do occur; for example in response to exogenous shocks to the political system, or new information from outside the system. Recent analyses in a few countries of the effects of macroeconomic adjustment (or lack of adjustment) on health outcomes provide a start in this area, since they involve study of changes in expenditures patterns as a function of a kind of exogenous shock to the system (in this case changes in the macroeconomic environment.[19]

Finally, work on the optimal ratio between curative and preventive interventions, and the optimal allocation of responsibility for coverage of each between the public purse (e.g. funded by general revenues or nation-wide insurance mechanisms) and the private purse, would provide a benchmark for normative judgments about overall patterns of public spending on health. In spite of the near-consensus that preventive care receives inadequate public spending (and inadequate private spending as well), it is clear that some curative care must be provided (well beyond that portion of curative care which has high externalities, such as care of tubercular patients), and even financed publicly. For example, in a practical sense, it may be difficult to convince consumers to use preventive care if needed referrals to adequate

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[18] See for example, World Bank (1986) on education spending and World Bank (1987) on health spending.

[19] Best known are those sponsored by UNICEF. Behrman (1988) and Pan American Health Organization (1989), who conclude that the impact of the macroeconomic crisis on health care and health outcomes has not been great.

curative care are not possible; and of course there are economies of scope in the combined provision of preventive and curative care.[20] In addition, it can be argued that all individuals benefit from the "option value" of availability of curative care, whether they ever actually use it or not. In the end, though in many settings it is possible to say that "too much" is spent on high-cost hospital care and "too little" on largely preventive basic care, the existing literature is virtually silent on the appropriate balance and criteria for determining that balance.

Some insight on this issue is likely to come from the small but growing literature on the cost-effectiveness of health interventions in industrialized countries. Insights from these include (World Bank, 1990; Barnum, 1990):

- Most primary prevention activities (such as health promotion campaigns against smoking, alcohol abuse and for exercise and use of motorcycle helmets) are "good buys";
- Some secondary prevention activities (such as cervical cancer screening and physical screening for breast cancer) are "good buys"; but many common secondary prevention activities (such as hypertension screening programs) are not cost-effective;
- Many treatment procedures are not cost effective, but some (including pacemaker implantation, hip replacements and treating of breast and cervical cancer, and even some coronary bypass surgery) are cost-effective.

The limitations of this literature are still very great: the literature has primarily been devoted to assessing the cost-effectiveness of medical procedures, has only been applied in industrialized countries and is still fraught with fundamental methodological and empirical problems. Research in this area is vital, both to clarify the outstanding questions and, prior to this, to force policymakers to ask the right questions and think correctly.

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[20] See Birdsall (1989) for discussion of this point in more detail.

Finally, in the area of the political economy of health spending, there is much scope for international comparative analysis. However, a preliminary step is thorough analysis at the national level of public investment and expenditure trends and their determinants in a range of developing countries. This kind of work is increasingly being undertaken at the World Bank, as health and other social sectors are now more frequently covered in general country reviews. These studies, to the extent they share a common conceptual framework, can eventually provide a basis for comparative work.

The rationale for work on the political economy of public spending on health, the simple analytics that might underline such work, and some of the central issues, are outlined further in Birdsall (1988) and Birdsall (1989).[21]

Alternative financing and cost control mechanisms. This category is actually a large but important subset of the category above. Systematic studies of alternative approaches to the financing (and provision) of health care in developed countries (e.g. Canada, Britain, and the United States), with a focus on their potential lessons for developing countries, are still rare. Yet a critical concern for developing countries is how to have reasonable health care without duplicating the experience of many developed countries with their large and rapidly rising share of resources in GDP devoted to health. There has been virtually no research on alternative approaches to health insurance (and to social insurance more generally) and its effects of health outcomes in developing countries. Systematic comparative studies and controlled experiments in developing countries (such

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[21] For a critique of the former, see Reich (forthcoming).

as the Rand insurance study in California in the 1970s[22]) would have high payoff.

Even where health systems are highly decentralized with heavy reliance on the private sector, the need to implement some forms of cost control seems reasonable. Alternative cost control mechanisms include use of fees and insurance copayments and deductibles; (on the demand side) and on the supply side rationing of access to medical school, to expensive technologies and to drugs; centralized controls on the prices and number of procedures, including diagnostic-related group pricing; and use of preferred providers and other related mechanisms by those who are financing health, such as employers or insurance systems. Though these mechanisms are increasingly employed in developing countries, especially in Latin America,[23] and greater recourse to them is widely discussed, little empirical work has been done on their effects in reducing costs relative to any effects on health outcomes in developing countries.

Adult health. Additional work on the above three topics will be dependent on improvement in data and methodology for study of adult health, including adult mortality but especially adult morbidity. Figure 1 provides a rough summary of this author's knowledge of the extent of the literature relating health and development; it compares work on determinants and consequences of child (including infant) and adult mortality and morbidity.

Under determinants (our concentration in this section), I know of little work in developing countries on adult mortality and virtually no work on adult

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[22] Manning et. al. (1987).

[23] See World Bank (1989a) for a summary at the country level of use of these mechanisms, covering chiefly North and South America and Europe.

morbidity.[24] This is surprising since most societies allocate resources in a manner than apparently places a higher priority on reducing adult deaths and adult morbidity than reducing infant mortality; in many developed countries, the bulk of health spending is concentrated on the very old. What lies behind what economists would call a revealed preference for better adult health over reductions in infant and child mortality?[25] In the developed countries there

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[24] See World Bank (989a) "Brazil: Adult Health in Brazil: Adjusting to New Challenges," for assessn. nt of the data on adult health in Brazil, a developing country with more information than most.

[25] I am grateful to William McGreevey for stating this problem in terms of revealed preference. He notes: "Research needs to help reformulate our use of indicators in such manner as to assure that the indicators adequately reflect revealed preference and not just an imposed value judgment implicit, for example, in a narrowly-conceived program such as UNICEF GOBI strategy that only emphasizes the needs of one age segment of the population." Revealed preference in most countries suggests heavy preference weights for adult health, even taking into account that the unit costs of dealing with adult morbidity are higher than unit costs of dealing with infant mortality. In the U.S., an Institute of Medicine study attempted to elicit judgments from health professionals on the relative undesirability of death at different ages. The death of an adult (15-59) was judged by those interviewed as 2.5 to 10 times more undesirable than the death of a child. The death of a person 60 years or older was judged to be 0.2 to 0.1 times more undesirable than the death of a child.

Figure 1: Literature on Health and Development

	Determinants	Consequences	Data Availability and Quality
Infant and child mortality	Extensive Examples: Rosenzweig and Schultz (1982); Thomas et al. (1990)	Nil	Good
Infant and child morbidity	Extensive Examples: Cebu Study Team (1990); Wolfe and Behrman (1987)	Limited Examples: Moock and Leslie (1986)[26]	Good
Adult mortality	Limited	Nil	Poor
Adult morbidity	Limited (World Bank 1989a)	Limited Examples: Strauss (1986); Deolalikar (1988)	Poor

[26] For a study using United States data, see Salkever (1982).

is growing attention to economic analysis of problems of medical ethics, especially on the question of optimal spending on heroic measures to extend the lives of the elderly. Analytic work on these issues may be even more important in the developing countries, where resources are scarcer, government's role in centralized decisions regarding resource use is often greater, and the biases that arise from an unequal distribution of income may exacerbate distortions in use of health resources. One example of such work would be analysis of household behavior regarding health looking at the demand for health in the broadest sense, including the demand for relief of pain and suffering associated with adult non-communicable diseases and adult disability.

Similarly, analysis of the political economy of health spending, particularly of the political impetus behind rising costs, will not be fruitful without new work on the costs and determinants (and consequences) of adult morbidity. The epidemiological transition is already upon us in many countries of the developing world, bringing relatively higher incidence of "adult" chronic diseases alongside the continuing high incidence of the childhood infectious diseases. Data on the incidence and distribution (across age and socioeconomic groups) of adult morbidity, including injuries and disability, are critical to analysis of the likely effects of income growth and the aging of populations on the demand and overall costs of health care in developing countries, and to the design of prevention and health promotion programs. A striking example is available from Briscoe's analysis of Brazilian data (World Bank, 1990); he shows that if various kinds of injuries are combined, including auto crashes, homicide and suicide, the category of injuries accounts for more potential years of life lost for those aged 1 to 65

years than any other category (such as cancers, infectious and parasitic diseases, cardiovascular disease). Yet there is virtually no organized research on the topic of injuries in developing countries.[27]

Eventual Difference Research Might Make

Research on household demand for health and on health behavior would obviously contribute to better design of public health and nutrition programs, for example by improving understanding of how education improves health and whether and how public information and services can substitute in the short run for education. It could lead to more sustainable financing of health care, through greater understanding of whether and how to implement user charges and how to rely on private sector programs without prejudicing public health goals or restricting access of the poor to health services. Health planners have naturally tended to focus on problems of the health system -- supply-side problems -- as the critical constraint to improving health. A great advantage of household studies is their emphasis on the demand side, on beneficiaries as consumers, and on behavior, including health-seeking behavior.

Research on the political economy of public expenditures on health would broaden the nature of health policy discussion in the international public health community beyond the (important and relatively well-understood) area of primary health care, and could contribute to improvements in the public management (including regulation, quality control, and monitoring of private provision of health care) and financing of health care. Research in this area

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[27] See Jamison and Mosley (1990, forthcoming) for an impressive effort to tackle health sector priorities by looking across disease and injury categories.

would also help to clarify the role of the nonmedical community and nonmedical public agencies in health care (e.g. highway safety, occupational health, regulation of food and drugs, public information regarding the health effects of diet, smoking, alcohol, drug abuse and exercise).

Research on financing and cost control issues in developed countries is flourishing; some of the emerging lessons are relevant for developed countries. But differences in income, in the organization of health systems, and in the adequacy of capital and insurance markets mean such work must also be carried out in developing countries if they are to fully benefit. Such research would contribute to more sustainable programs, and to greater realism about tradeoffs in spending within health systems.

Research on adult health would open up entire new frontiers; it could link the work on household behavior with work on the political economy of health spending, since it is adults who make the decisions regarding the allocation of household resources to health, and who influence allocation of public resources across and within sectors. Research on adult health is critical to setting priorities within the health system and to the design of health programs to prevent and control noncommunicable disease and injuries. Finally, research on the determinants of adult health would generate a set of concepts and data that are essential for analysis of the consequences of the health of populations for the development of their countries -- the subject of the next section.

II. The Effects of Health on Development

State of the Art

Economists have long theorized about the possible effects of poor health on labor productivity and thus income growth in developing economies; the efficiency wage hypothesis (Leibenstein, 1957; Stiglitz, 1976) for example, posits that employers in developing countries may pay wages above market rates because below a certain wage employees will be less productive due to poor health or nutrition. More recently, economists working on the modelling of economic growth have built upon possible externalities in human resources (with more emphasis on education and knowledge than on health, but not excluding health) (Azariadis and Drazen, 1990);[28] it seems likely that some level of good health in a population may generate positive externalities that cannot be captured by particular (healthy) individuals but are shared by society as a whole in the form of more rapid economic growth. However, compared to the extensive literature on the determinants of health (and thus on the effects of various indicators of development on health), there is much less work on the effects of health on development -- or on what might be called the consequences of health for development. (See Figure 1 above.)

A number of reviews in the 1980s (Gwatkin, 1983; Andreano and Helminiak, 1988; Strauss, 1985) concluded that the possible link between better health and greater productivity and income had not been established, either because research results of most studies were inconclusive or because the research

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[28] See also Lucas (1988) and Romer (1986).

methods used were flawed. There are good reasons for this lack of success.

First, studies that concentrate on the effects of individual health on simple output measures of labor productivity (e.g. the effects of anemia on labor productivity of sugarcane workers) might well be missing the much larger potential effect that better health would have through contributing to entrepreneurship, willingness to invest (including in education, job search and so on), and creativity in general; these effects would be extraordinarily difficult to capture empirically. Second, as noted by Over et. al. (1989), in a recent thoughtful summary of work on the consequences of health for development, negative consequences of poor health may be difficult to document empirically because households and entire communities adopt coping mechanisms when illness strikes.[29] Coping may reduce the costs of poor health, but may also itself entail costs. These costs may not be directly reflected in lost family income or reduced productivity. Costs may instead be reflected in reduced health of other family members, reduced consumption or foregone investment, reduced leisure of other family members, or even break-up of families. But costs such as these, especially costs imposed on other family members, have not generally been studied and are difficult to study without specially designed data.[30]

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[29] For example, households that include sick members are more likely to receive private transfers from other households, as documented by Cox and Jimenez (1989).

[30] Salkever (1982) estimated using U.S. data on families with handicapped children that the hidden costs included at least an estimated $1 billion (in 1975 dollars) of lost family income due to reduced maternal working hours. This appears to be one of the few such studies of the costs of foregone labor of parents of disabled children.

Despite these problems, there has been some success in establishing that better health contributes to higher productivity at the individual level, as the increasing availability of data sets that include information on time use of household members, as well as income and own-production and measures of health, has permitted more definitive work on the issue. In their recent review, Behrman and Deolalikar (1988) put particular weight on recent studies by Strauss (1986) using data from Sierra Leone and Deolalikar (1988) using data from south India. These two authors report positive effects of "effective family labor" (itself a function of family labor hours and measures of food availability or anthropometry) on agricultural productivity. These studies are convincing because the authors take into account the likelihood that worker health status is itself an endogenous result of prior individual choices -- and they still find separate effects of health status on labor productivity. Other recent studies, by Moock and Leslie (1986) and Jamison (1986), suggest that nutritional status of children (in particular, height-for-age, a cumulative measure of nutritional status over time) affects school performance,[31] adding to the evidence that in general better health does speed development.

Better documentation of any effects of health status on productivity and income gains could, obviously, increase the interest of policymakers concerned with economic growth, in health. It is, however, only a first step. Ideally it should be possible to compare the benefits of investments in health (as a first step at least in terms of private income gains) to the costs of the

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[31] Behrman and Deolalikar note that these studies may be misleading, if certain children are both healthier and do better in school, with no causal impact of the former on the latter.

investments that generated the additional income gains; such cost-benefit analysis would permit comparison of the rates of return to investments in health with rates of return to alternative investments (in, say, physical infrastructure, other social programs, and so on). In contrast to the large literature on the economic rates of return (private and social) to investment in education (based on increments in lifetime expected income as they are related to increments in education at the aggregate and individual level),[32] work on the private and social returns to investments in health is sparse indeed (see Figure 1).

Potential for Breaking New Ground

Three fruitful approaches to new work on the consequences of health for development can be distinguished.

Productivity effects at the individual level. The first, on the labor and school productivity effects of health status at the household level (and indirectly on the private rate of return to investments in health), is typified by the work of Strauss, Deolalikar and Jamison cited above. This type of work is still in its infancy, and there is great potential for improved understanding if more of it is done.

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[32] For a recent review of the literature on the private and social rates of return to education, including in developing countries, see Psacharopoulos (1985). Behrman and Birdsall (1987) review a number of studies suggesting that the estimated private returns (though not necessarily social returns) reported by Psacharopoulos are probably biased upward, for a variety of reasons -- but are still high relative to private rates of returns to many physical investments in developing countries. Haveman and Wolfe (1984) point out that social returns to education may be underestimated because they fail to take into account such likely positive externalities as the effects of education on improving health -- an effect noted above.

Social cost-benefit analysis of health investments. The second approach would be cost-benefit analysis of health investments, taking into account social as well as private costs and benefits.[33] Cost-benefit analysis of health investments is rare. Longstanding tradition in the health community that a value cannot and should not be put upon life has combined with daunting conceptual problems and poor data on costs to prevent the emergence of any strong research tradition of cost-benefit analysis of health investments, even in developed countries.

On the benefits side, the problem is valuation of health benefits in a manner that allows comparison of health to other benefits, i.e. in money terms.[34] Alternative measures include use of the "human capital approach", which values additional days (or years) of healthy life in terms of the economic productivity of the individual's labor, and the willingness-to-pay approach, which values health in terms of what people would pay to attain or keep it. Both present difficulties. The former, for example, requires judgments on an appropriate rate for discounting future potential income; and on whether and how to apply productivity weights (should an additional day of healthy life be valued identically for a baby and a productive adult?; should the life of a low-wage earner be valued less than that of a high wage earner?) It requires further judgments on the weights to apply to different illnesses and to death, in order to distinguish among healthy days of life that would

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[33] This would be distinct from the cost-effectiveness analysis discussed above. Cost-effectiveness analysis compares the costs of alternative approaches to achieving a specific health objective. Cost-benefit analysis compares the social benefits of investing in health vs. non-health investments.

[34] This is not necessary for comparing the benefits of alternative health investments, as in cost-effectiveness analysis. Only benefits in terms of improved health (e.g. additional days of healthy life) are then necessary.

otherwise have been lost to death and to various degrees of morbidity and disability.[35] The willingness-to-pay approach is likely to be distorted by differences across households in income; for the same set of preferences, richer households are likely to have higher willingness to pay than poorer households. In the end, it is difficult to place a value on a human life; even were it simple to do so, it would still be difficult to place a value on the social gains associated with general improvements in health, in terms of creativity, entrepreneurial capacity and other X-efficiency type measures (Leibenstein, 1957) or on the avoidance of the costs to the families and communities of those individuals who suffer poor health.

On the cost side, researchers face great difficulties in obtaining good data, particularly in many developing countries where information systems are weak and public provision of much care through centralized systems lacking budget accountability has destroyed incentives to measure costs. The best work on costs has been done in connection with efforts to analyze the cost-effectiveness (i.e. the least-cost way to achieve a certain goal) of different programs that fall under the rubric of primary health care.[36] Data on hospital costs and on costs of overall systems are even rarer.[37]

The potential for breaking new ground in cost-benefit analysis is huge in the long run, but poor in the short run. In the current environment, academic researchers doing applied research inevitably are drawn to areas of

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[35] See Barnum (1987) for application of weights to epidemiological data from Ghana.

[36] See Abel-Smith (1989) for a discussion of cost-effectiveness. He cites work by Mills (1985).

[37] But see Barnum and Kutzin, 1990.

work where a research tradition has already developed (the paradigm is set), where methodological issues are relatively well-drawn (though breakthroughs may be needed, the need itself is implicitly recognized) and where data are already available or the mechanisms for collecting data are well known. (For example, for work on the determinants of health, the mechanisms for collecting representative household data for analysis of household behavior in such areas as health have been the subject of considerable effort in the last two decades). None of these factors obtains today.

Consequences of poor health for households and communities. The third approach would be greater attention to the consequences of poor health for households and communities. This might be considered a sensible partial approach, concentrating on individual and community costs, to the larger challenge of cost-benefit analysis. Though little such work has been completed, World Bank staff are currently exploring the possibility of undertaking research along these lines, concentrating on the consequences of adult ill health. The feasibility of more general work on adult health issues (including measurement of adult mortality, and study of the determinants of adult health) is also being explored; any work on adult health would be likely to increase our understanding of the consequences of poor health for the development process.[38]

[38] Regarding the World Bank's recent efforts, see Over et. al. (1989), and Feachem (1989). The World Bank has also recently completed two country studies, of Brazil and China, each with a heavy concentration on issues of adult health; see World Bank (1989a and 1989b).

Eventual Difference Research Might Make

Research on the consequences of health for economic development could affect both the amount of public resources devoted to health, and the allocation of such resources. In a world of scarce resources, there will inevitably be competing claims for resources for development programs, all of which are "worthy" in terms of delivering specific increments of improved welfare (an additional day of healthy life, an increment of ability to read and write; an increment of security in old age). If the short-term welfare benefits of two or more competing claims on society's resources are exactly equivalent, then the "productivity" of alternative investments (i.e. the effects on income-generating capacity) is and should be a decisive factor in choice of investments -- since the additional income accruing to individuals as a result of the productivity factor is an input to long-term welfare.[39] There is little question that the literature on returns to education has influenced both the volume and the allocation of educational investments. This is most obviously the case among donors, who have consistently supported educational investments in developing countries, and in the last decade, have emphasized support to primary education because of its high social returns

[39] Some would argue that additional income at some point would reduce health status, as more people smoke, as the risks of traffic injuries rise with more cars, etc. It is true that the effects of productivity gains on health status are not necessarily clear, since the effects of income on health are not clear. It is clear, however, that the effects of productivity gains on welfare (as opposed to health, which may be one argument of the welfare function) will be positive. If higher income allows people to choose to live shorter but happier lives (because they enjoy smoking or red meat), their welfare if not their health has improved.

compared to secondary and higher education.[40] The health sector could similarly benefit.

Thus the subject of the effects of health on development is one where good research would probably make a difference (by increasing the volume and improving the allocation of resources for health investments) but where the field is at least two decades behind the state of the art in education. The difficulties -- in terms of concepts, data and methods -- are greatest in the area of the economic and social consequences of adult ill health, both for the affected individual, and his or her community; yet work on this issue is critical to cost-benefit analysis of health investments. Because so little has been done, the short-run returns to a major push in this area would be small and the risks of a long period of difficulty in reaching straightforward, widely-accepted results are great. However, there are risks as well in failing to begin.

Conclusions

Research on the determinants of health at the household level could contribute to better design of public programs meant to improve health; this is particularly the case insofar as much future improvement in health in developing countries will rely on changes in behavior at the individual and household level. Research on the demand for health care, including the price elasticity of demand for health services, and on the effects of health service utilization on health itself, could improve pricing policies of governments

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[40] The World Bank has consistently emphasized the high rates of return to education in its publications, including in the World Development Reports of 1980, 1981, 1984; and in policy studies of financing education (1986) and of education issues in Africa (1988).

and contribute to design of mechanisms to control costs on the supply side as well. Work on the determinants of adult (as opposed to infant and child) health should be a high priority (adult morbidity as well as mortality), especially given the epidemiological and demographic transitions going on in virtually all developing countries. Better understanding of the political economy of health, especially of alternative financing and cost control mechanisms, combined with work on the determinants of adult health will be critical to public policy to deal with the rising costs of health care, appropriate design and financing of health insurance, and the increasing need to emphasize prevention and control of adult chronic and degenerative disease.

On the consequences side, more systematic analysis of the social returns to investments in health in developing countries may turn out to be absolutely necessary to support continuing increases in ever more costly health care. On the one hand, it is difficult to do cost-benefit analysis of health investments, in part because of the difficulty of valuing human life, and of valuing a healthy and pain-free life as compared to a sick and painful one. And good health is a legitimate end in itself, central to individual welfare. On the other hand, other approaches are possible, including analysis of the effects of health status on individual productivity (at work and in school) and analysis of the social and economic costs of poor health for families and communities. Efforts to measure the returns to investments in good health are critical in a world of scarcity, where the benefits of many worthwhile investments must be compared. Moreover, such efforts are likely to change not only our sense of how much to invest in health, but how to allocate such investments.

REFERENCES

Abel-Smith, B., (1989) "Health Economics in Developing Countries," Journal of Tropical Medicine and Hygiene, 92:229-241.

Akin, J., N. Birdsall and D. de Ferranti, (1987) Financing Health in Developing Countries: An Agenda for Reform, The World Bank, Washington, D.C.

Akin J.S., C.C. Griffin, D.K. Guilkey, B.M. Popkin, (1985) The Demand for Primary Health Services in the Third World, Rowman and Allanheld Publishers.

Andreano, R. and T. Helminiak, (1988) "Economics, Health and Tropical Diseases: A Review," pp. 19-72, in A.N. Herrin and P.L. Rosenfield, eds., Economics, Health and Tropical Diseases, University of the Philippines, School of Economics.

Azariadis, Costas and Allan Drazen, (1990) "Threshold Externalities in Economic Development," Quarterly Journal of Economics.

Barlow, R., (1979) "Health and Economic Development: A Theoretical and Empirical Review," Research in Human Capital and Development, Vol. I, 45-75.

Barnum, H., (1988) "Interaction of Infant Mortality and Fertility and the Effectiveness of Health and Family Planning Programs," PPR Working Paper No. 65, (July), The World Bank.

Barnum, H., (1987) "Evaluating Healthy Days of Life Gained from Health Projects," Social Science and Medicine, Vol. 24, no. 10, 833-841.

Barnum, H. and R. Greenberg, (1990, forthcoming) "Cancers," in Evolving Health Sector Priorities in Developing Countries, D.T. Jamison and W.H. Mosley, eds., The World Bank, Washington, D.C.

Barnum, H. and Kutzin, (1990) "Patterns of Hospital Resource Use in Developing Countries" PHN Technical Note, The World Bank.

Barrera, Albino, (1990) "The Role of Maternal Schooling and Its Interaction with Public Health Programs in Child Health Production," Journal of Development Economics.

Behrman, J.R., (1988) "Intrahousehold Allocation of Nutrients in Rural India: Are Boys Favored? Do Parents Exhibit Inequality Aversion?" Oxford Economic Papers.

Behrman, J.R. and N. Birdsall, (1987) "Communication on Returns to Education: A Further Update and Implications," Journal of Human Resources.

Behrman, J.R. and A.B. Deolalikar, (1988) "Health and Nutrition," pp. 631-711, in H. Chenery and T.N. Srinivasan, eds., Handbook of Development Economics, Amsterdam: North Holland.

Behrman, J.R. and B.L. Wolfe, (1987) "How Does Mother's Schooling Affect the Family's Health, Nutrition, Medical Care Usage, and Household Sanitation?" Journal of Econometrics.

_____, (1989) "Does More Schooling Make Women Better Nourished and Healthier? Adult Sibling Random and Fixed Effects Estimates for Nicaragua," Journal of Human Resources.

Birdsall, N., (1980) "Population Growth and Poverty in the Developing World," Population Bulletin, Population Reference Bureau, Inc., 35:5, Washington, D.C.

Birdsall, N., (1988) "Thoughts on Good Health and Good Government," Daedalus, vol. 118, no. 1.

Birdsall, N., (1989) "Pragmatism, Robin Hood and Other Themes: Good Government and Social Well-Being in Developing Countries," The World Bank, Washington, D.C.

Birdsall, N. and E. James, (1989) "Efficiency and Equity in Social Spending: How and Why Governments Misbehave," draft prepared for Conference on Poverty, Airlie House, Virginia, IFPRI and World Bank.

Blau, David M., (1984) "A Model of Child Nutrition, Fertility, and Women's Time Allocation: The Case of Nicaragua," in T. Paul Schultz and Kenneth I. Wolpin, eds., Research in Population Economics, 5, Greenwich, Conn.: JAI Press.

Briscoe, J., J. Akin and D. Guilkey, (1990, forthcoming) "People Are Not Passive Acceptors of Threats to Health: Endogeneity and Its Consequences," The International Journal of Epidemiology.

Caldwell, J.C., (1989) "Introductory Thoughts on Health Transition," prepared for workshop, Cultural, Social and Behavioral Determinants of Health: What is the Evidence?, Canberra, Australia (May).

Cebu Study Team, (1990, forthcoming) "Underlying and Proximate Determinants of Child Health: The Cebu Longitudinal Health and Nutrition Study," American Journal of Epidemiology.

Cox D. and E. Jimenez, (1989) "Private Transfers and Public Policy in Developing Countries: A Case Study for Peru," PPR Working Paper No. 345, World Bank.

Deolalikar, A.B., (1988) "Do Health and Nutrition Influence Labor Productivity in Agriculture? Econometric Estimates for Rural South India," Review of Economics and Statistics, (May) 70:2.

Feachem, R.G., (1989) "The Health of Adults in the Developing World," The Washington, D.C., The World Bank (December, draft).

Feachem, R.G., W.G. Graham and I.M. Timaeus, (1989) "Identifying Health Problems and Health Research Priorities in Developing Countries," Journal of Tropical Medicine and Hygiene, 92:133-191.

Gertler, P. and J. van der Gaag, (1988) "Measuring the Willingness to Pay for Social Services in Developing Countries," LSMS Working Paper No. 45, The World Bank, Washington, D.C.

Gertler, P., L. Locay, W. Sanderson, A. Dor and J. van der Gaag, (1988) "Health Care Financing and the Demand for Medical Care," LSMS Working Paper No. 37, The World Bank, Washington, D.C.

Griffin, C., (1989) "Strengthening Health Services in Developing Countries Through the Private Sector," Discussion Paper no. 4, International Finance Corporation (IFC), Washington, D.C.

Gwatkin, D.R., (1983) "Does Better Health Produce Greater Wealth: A Review of the Evidence Concerning Health, Nutrition, and Output," Overseas Development Council.

Haddad, L. and H.E. Boris, (1989) "The Impact of Nutritional Status on Agricultural Productivity: Wage Evidence from the Philippines." University of Warwick, Development Economics Research Centre Discussion Paper 97 (September).

Halstead, S.B, J.A. Walsh and K.S. Warren, eds., (1985) Good Health at Low Cost, New York: The Rockefeller Foundation.

Haveman, R.H. and B.L. Wolfe, (1984) "Schooling and Economic Well-Being: The Role of Nonmarket Effects," Journal of Human Resources, (Summer), XIX:377-407.

Heysen, S. and P. Musgrove, (1986) "Interdepartmental Differences in Life Expectancy at Birth in Peru as It Relates to Income, Household Drinking-Water, and Provision of Medical Consultations," Pan American Health Organization (PAHO) Bulletin, 20 (1).

James, E., (1988) The Relationship Between Public and Private Sectors in Higher Education, report prepared for the International Academy of Education.

James, E., (1988) "Public and Private Higher Education in the Philippines," The World Bank, Washington, D.C.

Jamison, D.T., (1986) "Child Malnutrition and School Performance in China," Journal of Development Economics, 20:299-310.

Jamison, D.T. and W.H. Mosley, (1990, forthcoming) Evolving Health Sector Priorities in Developing Countries, World Bank book manuscript.

Jimenez, E., M. Lockheed and V. Paqueo, (forthcoming) "The Relative Efficiency of Private and Public Education in Developing Countries," World Bank Research Observer.

Leibenstein, H.A., (1957) Economic Backwardness and Economic Growth, New York: Wiley.

Lucas, R., (1988) "On the Mechanics of Economic Development," Journal of Monetary Economics, 21, 3-42.

Manning, Willard G., J.P. Newhouse, N. Daan, E. Keeler, B. Benjamin, A. Leibowitz, M.S. Marquis and J. Zwanziger, (1987) Health Insurance and the Demand for Medical Care, The Rand Corporation, Santa Monica, CA.

Martorell R. and G. Arroyave, (1984) "Malnutrition, Work Output, and Energy Need," paper presented at the International Union of Biological Sciences Symposium on Variation in Working Capacity in Tropical Populatio- , mimeo.

Merrick, T.W., (1985) "The Effect of Piped Water on Early Childhood Mortality in Urban Brazil, 1970-1976," Demography, 22:1-24.

Mills, A., (1985) World Health Statistics Quarterly, 38, 402.

Moock and Leslie, (1986) "Childhood Malnutrition and Schooling in the Terai Region of Nepal," Journal of Development Economics, 20:33-52.

Mosley, W.H., (1989) "Potential for Social Science Research to Inform and Influence the Delivery of Health Care in Less Developed Countries." Paper presented at Health Transition Workshop III: The Potential of Social Science Research, Cambridge, Mass., June, 27-30.

Mosley, W.H. and L.C. Chen, (1984) "An Analytic Framework for the Study of Child Survival in Developing Countries," Population and Development Review, 10:25-48.

Over, M., R. Ellis, J. Huber and O. Solen, (1989) "The Consequences of Adult Ill Health," World Bank draft (December).

Pan American Health Organization, (1989) "Health and Development: Repercussion of the Economic Crisis," Report No. CE103/7, (September), Washington, D.C.

Pitt and Rosenzweig, (1985) "Health and Nutrient Consumption Across and Within Farm Households," Review of Economics and Statistics, 67:212-223.

Preston, S.H., (1980) "Causes and Consequences of Mortality Declines in Less Developed Countries During the Twentieth Century," in R.A. Easterlin, ed., Population and Economic Change in Developing Countries, Chicago: University of Chicago Press.

Preston, S.H., (1983) "Mortality and Development Revisited," University of Pennsylvania, mimeo.

Psacharopoulos, G., (1985) "Returns to Education: A Further International Update and Implications," The Journal of Human Resources, vol. XX, no. 4, (Fall), 584-604.

Rashad, H., (1989) "Oral Rehydration Therapy and Its Effect on Child Mortality in Egypt." Journal of Biosocial Science Supplement, vol. 10, 105-113.

Reich, M., (forthcoming) "The Political Economy of Health Transitions," Health and Social Change, in L. Chen et al., eds.

Romer, Paul M., (1986) "Increasing Returns and Long-Run Growth," Journal of Political Economy, 94:5, 1002-1036.

Rozenzweig, M.R. and T.P. Schultz, (1982) "Child Mortality and Fertility in Colombia: Individual and Community Effects," Health Policy and Education, 2. Amsterdam: Elsevier Scientific Publishing Co., pp 305-348.

_____, (1982) "Market Opportunities, Genetic Endowments, and Intrafamily Resource Distribution: Child Survival in Rural India," American Economic Review, 72:4 (September), 803-815.

Rozenzweig, M.R. and K.J. Wolpin, (1986) "Evaluating the Effects of Optimally Distributed Public Programs," American Economic Review, 76:3 (June), 470-487.

_____, (1989) "Migration Selectivity and the Effects of Public Programs," Journal of Public Economics, (June).

Salkever, D.S., (1982) "Children's Health Problems: Implications for Parental Labor Supply and Earnings," in V.R. Fuchs, ed., Economic Aspects of Health, Chicago: University of Chicago Press, 221-251.

Schwartz, J.B., J.S. Akin and B.M. Popkin, (1988) "Price and Income Elasticities of Demand for Modern Health Care: The Case of Infant Deliveries in the Philippines," Vol. 2, no. 1, 49-76.

Stevens, C.M., (1977) "Health and Economic Development: Longer-Run View," Social Science and Medicine, Vol. II, 809-817.

Stiglitz, (1976) "The Efficiency Wage Hypothesis, Surplus, Labour, and the Distribution of Income in LDCs," Oxford Economic Papers, New Series, 28:185-207.

Strauss, J., (1985) "The Impact of Improved Nutrition in Labor Productivity and Human Resource Development: An Economic Perspective," Economic Growth Center discussion paper no. 494, Yale University.

Strauss, J., (1986) "Does Better Nutrition Raise Farm Productivity?" Journal of Political Economy, April.

_____, (1989) "Households, Communities and Preschool Children's Nutrition Outcomes: Evidence From Rural Cote d'Ivoire," Economic Development and Cultural Change.

Thomas, D., J. Strauss and M. Henriques, (1990, forthcoming) "Child Survival, Height for Age and Household Characteristics in Brazil," Journal of Development Economics.

Wheeler, David, (1980) "Basic Needs Fulfillment and Economic Growth: A Simultaneous Model," Journal of Development Economics, 7:435-451.

Wolfe and Behrman, (1987) "Women's Schooling and Children's Health: Are the Effects Robust with Adult Sibling Control for the Women's Childhood Background?" Journal of Health Economics.

World Bank, (1986) Financing Education in Developing Countries: An Exploration of Policy Options, Washington, D.C.

World Bank, (1980) World Development Report, Washington, D.C.

World Bank, (1981) World Development Report, Washington, D.C.

World Bank, (1984) World Development Report, Washington, D.C.

World Bank, (1988) "Brazil -- Public Spending on Social Programs: Issues and Options," Report No. 7086-BR, Vol. 1, May 27, 1988.

World Bank, (1988) Education in Sub-Saharan Africa: Policies for Adjustment, Revitalization and Expansion, Washington, D.C., The World Bank.

World Bank, (1989a) "Brazil -- Adult Health in Brazil: Adjusting to New Challenges," Report No. 7807-BR, November 14, 1989.

World Bank, (1989b) "China -- Long-Term Issues and Options for the Health Sector," Report No. 7965-CHA, March 1990.

World Health Organization, (1988) Expanded Progress on Immunization Programs for the Control of Vitamin A Deficiency: The Role of the EPI in New Initiatives for the 1990s, WHO-EPI-GAG, Working Paper no. 11, Rev. 1.

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